

MATHEMATICS

David B. Klanderman, Ph.D, department chairperson



“THE PROFESSORS HERE HAVE BEEN PRAYERFULLY
guiding me toward my career choices and providing me with a diverse
knowledge of mathematical concepts along the way.”

Peter Keep '11
Mathematics (Selby, Ontario)

The mathematics major prepares students for advanced study in one of the sciences or to pursue the study of mathematics in graduate school. The mathematics education major prepares students to teach mathematics in secondary school.

The **mathematics major** consists of 42 hours:

Mathematics 111, 112, 210, 211, 301, 400, 401;

Four mathematics electives at the 200-level or higher;

Required Cognates: Communication Arts 101; Computer Science 111, and 112.

Note: Mathematics 280, 380, and 381 do not count toward the mathematics major.

The **secondary education mathematics major** consists of 43 hours:

Mathematics 111, 112, 210, 211, 301, 302, 321, 351, 380, 401;

One mathematics elective at the 200-level or higher;

Required Cognates: Computer Science 109, 111.

Students with a teaching major in mathematics education will minor in education and follow the secondary education minor course requirements listed in the education department section of the catalog.

The **mathematics minor** consists of 18 hours:

Mathematics 111, 112, 211, and two mathematics electives at the 200-level or higher.

Note: Mathematics 280, 380, and 381 do not count toward the minor.

The **mathematics education minor** consists of 22 hours:

Mathematics 109 (or 110), 105 (or 151), 111, 210, 380;

One from 301, 302, 321, 370, or 399;

Computer Science 109.

Note: Mathematics 280 does not count toward the minor but is required for the elementary education major normally paired with this minor. Elementary Education and Special Education majors must take mathematics 109 and 110 as part of their major requirements.

Mathematics Courses (MATH)

Note: Semesters listed are when courses are normally offered. However, course offerings and scheduling are subject to change at the discretion of the department.

100 Intermediate Algebra (3)

Fall

This course prepares students for Mathematics 101 by emphasizing concepts and skills contained in an intermediate algebra course. Students will strengthen their backgrounds in algebraic manipulation and equation-solving, and will study systems of linear equations and absolute values as preparation for more advanced mathematics courses. *Does not fulfill the mathematics general education requirement.* Prerequisite: two years of college preparatory high school mathematics.

101 Precalculus (4)

Spring

This course examines functions and relations from numerical, symbolic, graphical, and descriptive points of view. Algebraic and transcendental functions such as polynomial, rational, exponential, logarithmic, trigonometric, and inverse trigonometric will be the primary focus. Labs designed to reinforce prior material through collaborative work and introduce applications of functions will be interspersed throughout the course. Supplementary topics include conic sections, polar coordinates, and complex numbers. *Does not fulfill the mathematics general education requirement.* Prerequisite: three years of college preparatory high school mathematics or Mathematics 100.

103 Mathematics within a Liberal Arts Tradition (3)

Fall, Spring

This course examines the discipline of mathematics from a variety of interrelated perspectives. These perspectives include historical, philosophical, and cultural origins of the discipline; the nature of the discipline; and applications of the discipline to the natural and social sciences as well as to everyday life. *Fulfills the mathematics general education requirement.* Prerequisite: three years of college preparatory high school mathematics.

105 Statistics for the Social Sciences (3)

Spring

This course examines concepts necessary for proper application and interpretation of statistical methods. Topics include descriptive statistics, probability and probability distributions, inferential statistics, and an advanced topic (e.g., chi-square analysis). Use of appropriate technology complements the instruction. *Fulfills the mathematics general education requirement.* Prerequisite: three years of college preparatory high school mathematics.

109 Math Concepts for Teachers I (3)

Fall

This course is a study of sets, logic, proof, systems of numeration, mathematical systems, development of the number system, and problem-solving applications. *Fulfills the mathematics general education requirement.* Prerequisite: three years of college preparatory high school mathematics.

110 Math Concepts for Teachers II (3)

Spring

This course examines topics in algebra, geometry, probability, statistics, calculators, computers, and problem-solving applications. Prerequisite: three years of college preparatory high school mathematics. *Fulfills the mathematics general education requirement.* Prerequisite: three years of college preparatory high school mathematics.

111 Analytic Geometry and Calculus I (4)**Fall**

This course examines functions, limits, derivatives, graphs, applications of the derivative, and the integral. *Fulfills the mathematics general education requirement.* Prerequisite: four years of college preparatory high school mathematics or Mathematics 101.

112 Analytic Geometry and Calculus II (4)**Spring**

This course examines applications of integration; logarithmic, exponential, trigonometric, and hyperbolic functions; techniques of integration; and infinite sequences and series. *Fulfills the mathematics general education requirement.* Prerequisite: Mathematics 111.

141 Finite Mathematics (3)**Fall, Spring**

Finite Mathematics is a subject which blends application with theory in (primarily) a discrete setting. Topics include financial mathematics models, linear system solution processes and utilization of matrices for applications in economics (Leontief models) and optimization (linear programming); enumeration techniques for applications in probability and Markov Chains; logic and recursion for applications in graph theory. *Fulfills the mathematics general education requirement.* Prerequisite: Mathematics 100 or 3 years of high school mathematics including 2 years of algebra.

151 Statistics (3)**Fall**

This course examines measures of central tendency and variability, graphic representation, binomial and normal distributions, sampling, estimation, hypothesis testing, regression, and correlation. This course is a non-calculus treatment primarily for students in the exact sciences or in business. *Fulfills the mathematics general education requirement.* Prerequisites: Mathematics 100 or 3 years of high school mathematics including 2 years of algebra; mathematics 111 or 141 recommended.

210 Discrete Structures (3)**Fall**

This course covers set theory, logic, algebraic structures, relations and functions, combinatorics, graphs and trees, boolean algebras, and algorithms. *Fulfills the mathematics general education requirement.* Prerequisite: Mathematics 111 or permission of instructor.

211 Analytic Geometry and Calculus III (4)**Spring**

This course covers conic sections, polar coordinates, vectors in two and three dimensions, partial derivatives, multiple integrals, and applications. Prerequisite: Mathematics 112.

280 Methods of Teaching Mathematics in Grades K-9 (3)**Fall, Spring**

In this course, students will study and implement a variety of pedagogical methods for teaching and learning of mathematics. Students will analyze sample mathematical learning activities and create their own learning tasks to satisfy criteria including mathematical significance, problem-solving, communication, and connections within mathematics and among other disciplines. Issues including the role of technology, equity and diversity, and assessment will be addressed. Prerequisites: junior standing, Mathematics 109 and 110, successful completion of the Basic Skills Test, and at least one education course.

301 Linear Algebra (3)**Spring**

This course covers vector spaces, theory of matrices, linear transformations, determinants, and quadratic forms. Prerequisite: Mathematics 211.

302 Abstract Algebra (3)**Fall, Odd**

This course is a study of mathematical structures such as groups, rings, integral domains, and fields. Factorization and congruence theories for integers and polynomials also are examined. Prerequisite: Mathematics 210.

310 Differential Equations (3)**Varies**

This course covers ordinary differential equations of first and second order, linear equations, operators, transforms, nonlinear equations, power series solutions, numerical methods, and applications. Prerequisite: Mathematics 211.

311 Real Analysis (3)**Varies**

This course examines the foundations of real number system, sequences and series, convergence, axiomatic development of limits, continuity, derivatives, integrals, line, and surface integrals. Prerequisite: Mathematics 211.

321 Geometry (3)**Fall, Even**

This course covers geometric transformations, advanced Euclidian geometry, non-Euclidian geometries, projective geometry, and foundations of geometry. Prerequisite: Mathematics 210.

341 Numerical Analysis (3)**Varies**

This course examines solutions of non-linear equations, systems of equations, and differential equations. Other topics include interpolation, approximation, and numerical integration. This course is identical to Computer Science 341. Prerequisites: Mathematics 210 and Computer Science 112.

351 Probability and Statistics (3)**Fall**

This course examines discrete and continuous probability distributions, mathematical expectations, moment generating functions, multivariate distributions, estimation, hypothesis testing, regression, and correlation. Prerequisite: Mathematics 112.

370 Topics in Advanced Mathematics (3)**Varies**

This course focuses on an advanced topic in mathematics determined by student demand. Possible topics include number theory, complex variables, measure theory, point-set topology, and second courses in abstract algebra, real analysis, and probability and statistics. Prerequisite: junior or senior standing in the mathematics program.

380 Teaching Mathematics in Grades 6-12 (3)**Fall, Even**

This course deals with methods and materials of teaching mathematics in grades 6-12. Students study topics such as instructional strategies, objectives and planning, individual difference, problem-solving, content and organization, curriculum trends, teaching aids, evaluating, and professional organizations. Prerequisites: junior standing, Education 203, and at least 12 hours in mathematics.

381 Methods and Strategies for Teaching Probability and Statistics (1) Varies

This course focuses on issues of pedagogy and technology used in the teaching and learning of probability and statistics. Students will be expected to design a unit plan, daily lessons, and projects that address statistical concepts and utilize appropriate technological tools and a variety of classroom learning environments. Prerequisites: completion of or concurrent enrollment in Mathematics 105, 151, or 351. Completion of and/or concurrent enrollment in Education 380 and/or Mathematics 380 is recommended.

399 Independent Study (2-4)**Fall, Spring**

Topics are selected from students' major interests. Prerequisite: permission of department.

400 Field Education (2-4)**Fall, Spring****401 Senior Seminar (1)****Fall**

This seminar provides an opportunity for students to reflect on the concepts, contextual, foundational, and worldview issues, and applications studied in past coursework. The seminar emphasizes how these issues will impact their lives beyond the College. Presentations, both in-class and off-campus, attended by students and made by students, are a key component of the course. Prerequisites: senior class standing and prior completion of at least six required courses in the major (excluding cognate course requirements).